Feb 9-9:15 AM

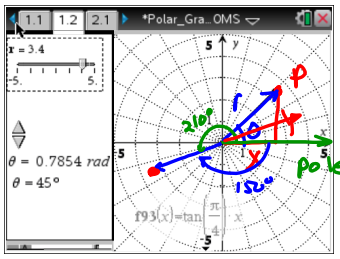
Polar Graphs

$r = \sqrt{x^2+y^2}$

$\theta = \tan^{-1}\left(\frac{y}{x}\right)$

$x = r\cos\theta$

$y = r\sin\theta$



$3.4 \angle 210°$ $(3.4, 210°)$

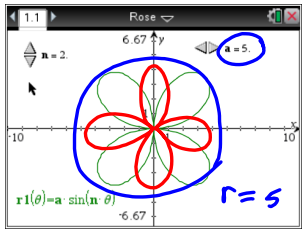
$r = 3.4 \quad \theta = 210°$

$r = 3.4 \quad \theta = -150°$

$r = -3.4 \quad \theta = 30°$

Feb 21-2:15 PM

Polar Graphs - Rose



n even $2n$ petals

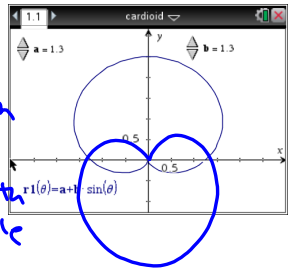
n odd n petals

a = petal length

$r = 5$

Feb 21-2:42 PM

Cardioids



$a < b$ limacon with a loop

$a > b$ limacon with a dimple

$a = b$ cardioid

Feb 21-2:42 PM

Area inside polar graphs

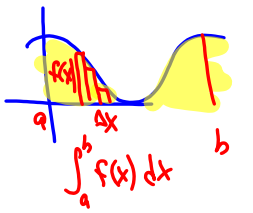
$A = \int_a^b \frac{1}{2} r^2 d\theta$

sector $A = \frac{1}{2} r^2 \Delta\theta$

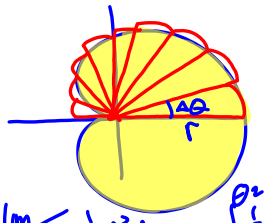
Find the area of the region in the plane enclosed by the cardoid

r = 2(1+cos θ)

$r = 2 + 2\cos\theta$



$\int_a^b f(x)\,dx$



$\lim_{\Delta\theta \to 0} \sum \frac{1}{2} r_i^2 \Delta\theta = \int_{\theta_1}^{\theta_2} \frac{1}{2} r^2 d\theta$

$\int_0^{2\pi} \frac{1}{2}(2+2\cos(\theta))^2 d\theta$

6π

Feb 21-2:43 PM

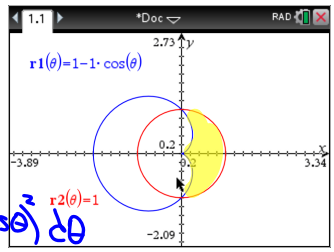
Find the area of the region that lies inside the circle r=1 and outside the cardioid r = 1 – cos θ

$\int_a^b \frac{1}{2} R^2 - \frac{1}{2} r^2 d\theta$

out inside

$2\int_0^{\pi/2} \frac{1}{2}(1)^2 - \frac{1}{2}(1-\cos\theta)^2 d\theta$

$\frac{-(\pi-8)}{4}$



Feb 21-2:46 PM

slope $r = f(\theta)$

$\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta} = \frac{f(\theta)\cos\theta + f'(\theta)\sin\theta}{f(\theta)(-\sin\theta) + f'(\theta)\cos\theta}$

$Y = r\sin\theta = f(\theta)\sin\theta$

$X = r\cos\theta = f(\theta)\cos\theta$

Feb 9-10:28 AM

Find the slope of the rose curve r = 2 sin (3θ) at the point where θ = π/6 and use it to find the equation of the tangent line. (calc ok)

Feb 21-2:50 PM